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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/907,903	07/19/2001	Kyoko Yamamoto	2185-0554P-SP	9946

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EXAMINER

HON, SOW FUN

ART UNIT	PAPER NUMBER
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1772

DATE MAILED: 04/09/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

AS-8

**Office Action Summary**

Application No.

09/907,903

Applicant(s)

YAMAMOTO ET AL.

Examiner

Sow-Fun Hon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                    | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____.  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                           | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>6,7</u> . | 6) <input type="checkbox"/> Other: .  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. In independent claim 1, it is unclear:

- a. Whether the micropores are completely filled by the substance;
- b. Whether the phrase "substantially in the form of ellipse" should be rewritten as "in the form of ellipses";
- c. What the value of the wavelength of light is since the electromagnetic spectrum is infinite;
- d. Whether the phrase "directions of micro pores along the major axis are oriented to substantially one direction" should be rewritten as "the micropores are oriented in one direction so that the major axes of the micropores are in substantially the same direction";
- e. How the direction of the micro pores along the major axis can be oriented to one direction if there is only one major axis which is created by the elongation of the pores caused by orienting the film containing the pores;
- f. How the component of polarized light is also polarizing.

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4. In claim 4, it is unclear whether the gas permeability of the microporous film corresponds to the property of the film without the substance in the micropores. In addition, it is unclear what the gas is since the gases have different permeabilities.

5. In claim 8, the phrase "the anisotropic substance is oriented to substantially one direction" should be rewritten as "the anisotropic substance in the micropores is oriented in one direction".

6. In claim 9,  $n_e$  and  $n_o$  should be labelled extraordinary and ordinary refractive indices respectively.

7. In claim 11:

g. The term "may be" should be replaced by the term "are" for plural use or "is" for singular use, otherwise the options would be indefinite;

8. In claim 12, it is unclear whether the term "piled" means located or laminated.

9. In claim 14, the term "approximately" should be deleted so as to render said claim definite.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-5, 7-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshinaga et al. (EP 0843197A2).

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Yoshinaga et al. teaches a liquid crystal device comprising a microporous polymer film and a substance (low molecular weight mesomorphic compound) in the micropores of the film, wherein the micropores are elliptical in form so that the ratio of the major axis to the minor axis of the ellipse is over 1, since the ratio of 1 would be that of a circle (spheroids). The minor axis size of the ellipse is 0.1 to 10 microns (diameter of a shorter axis of the spheroid) (column 4, lines 25-60 and column 5, lines 1-5) and would be smaller than the wavelengths of light greater than 0.1 to 10 microns. Since the porous film is taught to have a stretch ratio of 1.5 to 50 after uniaxial stretching (orientation in one direction) (column 5, lines 30-40), it is the examiner's position that the ratio of the major axis to the minor axis of the oriented ellipse is 1.5 to 50.

Yoshinaga et al. teaches that the refractive index of the substance (nematic liquid crystal with refractive index anisotropy since the ordinary and extraordinary refractive indices are not equal,  $n_o, n_{||}=1.7$  and  $n_e, n_{\perp}=1.5$ ) differs from the refractive index of the microporous film ( $n=1.4$ ) (column 24, lines 1-20) so as to function as a scattering film. The anisotropic scattering film has scattering anisotropy to a polarized component of a polarized light.

Yoshinaga et al. teaches that the polymer film is polypropylene with a 90 % porosity impregnated with liquid crystal (column 21, lines 10-35). It is the examiner's position that the microporous film has the claimed gas permeability of from 5 to 5,000 sec/100 cc.cm<sup>2</sup> since it has the 90 % porosity which is later filled by the liquid crystal.

12. Claims 1-3, 6-8, 10, 12-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Larson (US 5,751,388).

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Larson has a liquid crystal display which comprises a liquid crystal display panel having a polarizing plate on the front surface side and the back surface side (front 15 and rear 16 polarizers), the anisotropic scattering sheet (PSSE 17), a light guide (light source 13 and light guide 102 or 112) and a diffuse reflection plate (diffusely reflecting cavity 11) in that order (column 4, lines 15-55 and column 9, lines 55-70). A retardation plate (retarder 108) is located between the anisotropic scattering sheet (PSSE 109) and the reflection plate (reflector mirror 105) (column 10, lines 1-20). The transmission axis of the anisotropic scattering film and the transmission axis of a polarizing plate on the back surface side of the liquid crystal panel are approximately equal (PSSE transmits the majority of the light polarized along one optical axis (column 4, lines 15-55) so that since it has comparable axis of symmetry with a parallel-aligned absorbing polarizer (column 5, lines 40-50), the transmission axes are comparably parallel).

Larson teaches that the anisotropic scattering sheet (PSSE) is a uniaxial aligned liquid crystal filled microporous polymer film (PDLC structure) where the liquid crystal droplets are elongated into ellipses, oriented along one direction (stretched along axis 23) and the refractive indices of the liquid crystal are selected such that the ordinary index of the liquid crystal matches the corresponding refractive index of the polymer, and the other index (extraordinary) is highly mismatched (column 6, lines 20-40). The liquid crystal substance is polymerized (UV curable LC, polymeric LC) (column 8, lines 40-65).

### ***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Larson in view of Hirai et al. (US 5,103,327).

Larson has been discussed above, and teaches the liquid crystal display with the anisotropic scattering sheet, but fails to teach that the refractive index of the polymer,  $n$ , and the extraordinary refractive index  $n_e$  and ordinary index  $n_o$  of the liquid crystal should be such that  $0.01 < |n - n_e| > 0.6$  and  $0 \leq |n - n_o| < 0.05$ .

Hirai et al. teaches a liquid crystal panel (display element) comprising an anisotropic scattering sheet (liquid crystal polymer composite material) combined with a backlight and a mirror or a diffusion plate (column 4, lines 35-55). Hirai et al. teaches that the value of the refractive index anisotropy liquid crystal should be large,  $|n_e - n_o| > 0.22$  ( $\Delta n$ ), in order to obtain high scattering property values. The ordinary refractive index of the liquid crystal should agree with the refractive index of the polymer matrix in order to obtain high transmittance when an electric field is applied, that is,  $|n_o - n| = |n - n_o| < 0.03$  (column 8, lines 5-40). Let  $n = n_o$ , then  $|n_e - n_o| = |n_e - n| = |n - n_e| > 0.22$ .

Because Hirai et al. teaches that  $|n - n_o| < 0.03$  for high scattering in the absence of an electric field and  $|n - n_e| > 0.22$  for high transmittance upon application of an electric field, it would have been obvious to one of ordinary skill in the art to have used the criteria of Hirai et al. to govern the refractive indices of  $n$ ,  $n_e$  and  $n_o$  of the anisotropic scattering sheet of Larson in

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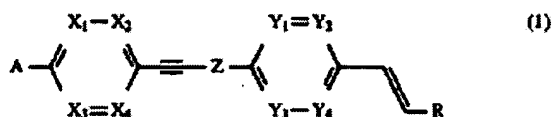
order to obtain the desired high scattering in the absence of an electric field, and high transmittance in the presence of an electric field.

15. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Larson in view of Tsubata et al. (US 5,762,825).

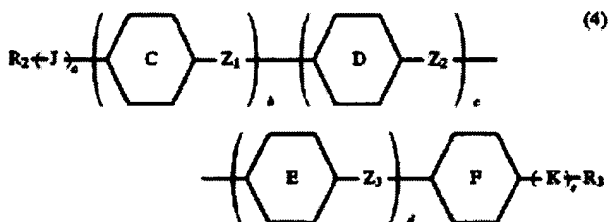
Larson has been discussed above, and teaches the liquid crystal display with the anisotropic scattering sheet, but fails to teach that the liquid crystal includes the claimed acetylene connected 1,4-phenylene unit formulas.

Tsubata et al. teaches a liquid crystal mixture having a large anisotropy of refractive index and a polymer dispersed liquid crystal device comprising the same (column 1, lines 5-15).

A liquid crystal mixture containing (a) at least one compound of a compound of the formula (1):



in which R is a C<sub>1</sub>-C<sub>12</sub> alkyl group, etc.; X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>, Y<sub>1</sub>, Y<sub>2</sub>, Y<sub>3</sub> and Y<sub>4</sub> represent, independently each other, CH, CF or N; A is a hydrogen atom, a 4-R<sub>1</sub>-(cycloalkyl) group, etc. in which R<sub>1</sub> is a C<sub>1</sub>-C<sub>12</sub> alkyl group, etc. and p is 0 or 1; and Z is —C≡C— or a single bond, and (b) at least one compound of the formula (4):



wherein rings C, D, E and F represent, independently each other, 1,4-phenylene, etc. which may be substituted by 1, 2 or 3 fluorine atoms; R<sub>2</sub> is a hydrogen atom, a C<sub>1</sub>-C<sub>12</sub> alkyl group, etc.; R<sub>3</sub> is a hydrogen atom, a fluorine atom, a fluoromethyl group, etc.; Z<sub>1</sub>, Z<sub>2</sub> and Z<sub>3</sub> represent, independently each other, —COO—, —OCO—, —OCH<sub>2</sub>—, —CH<sub>2</sub>O—, a C<sub>1</sub>-C<sub>3</sub> alkylene group, a C<sub>2</sub>-C<sub>3</sub> alkenylene group, etc.; J and K represent, independently each other, a methylene group or —O—; a, b, c, d and e represent, independently each other, 0 or 1.



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As seen above, Tsubata et al. teaches that the liquid crystal in the polymer dispersed liquid crystal has overlapping formula comprising the 1,4-phenylene units connected by the acetylene connector  $\equiv$ , also known as the  $C_2$  alkenylene group. The double bond in the terminal group R is polymerizable :



Tsubata et al. shows that the anisotropy of the refractive index of the liquid crystalline compounds is large compared to liquid crystalline compounds with non acetylene connected 1,4 biphenylene units (column 2, lines 25-40 and column 35, lines 20-65).

Because Tsubata et al. teaches that the anisotropy of the refractive index of the acetylene connected 1,4 biphenylene units is large compared to non acetylene connected 1,4 biphenylene units, it would have been obvious to one of ordinary skill in the art to have used the liquid crystals with the acetylene connected 1,4 biphenylene units and polymerizable end group of Tsubata et al. as the polymerizable liquid crystal compound with the desired highly mismatched refractive indices in the anisotropic scattering sheet of Larson in order to obtain the desired high scattering.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number is (703)308-3265. The examiner can normally be reached Monday to Friday from 9:00 AM to 6:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached on (703)308-4251. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

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Sow-Fun Hon

03/19/03

  
HAROLD PYON  
SUPERVISORY PATENT EXAMINER  
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3/19/03